

## PATENT SPECIFICATION



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## PROVISIONAL SPECIFICATION.

## Improvements in Fusible Plugs.

We, JOSEPH CAUTHERY, Mechanical Engineer, and WILLIAM SIMPSON SUTTON, Oil Merchant, both of 94, Market Street, Manchester, in the County of Lancaster, do hereby declare the nature of this invention to be as follows:—

This invention relates to fusible plugs comprising fusible metal or alloy and infusible or less fusible, parts between which the fusible metal or alloy is placed and its object is to provide fusible plugs which shall be more certain than fusible plugs hitherto provided have been, to operate if the parts of steam or other boilers or other vessels, tubes or cylinders or the like to which they are applied should become overheated from shortness of water or any other cause and shall also be simple in construction.

The invention consists in a fusible plug formed as or comprising a nipple or screwed plug, hereinafter for simplicity called a nipple, with a conical hole, a cylindrical pin placed centrally in the conical hole in the nipple and fusible metal or alloy between the pin and the nipple; also in such a fusible plug in which fusible metal or alloy between the nipple and the central pin is formed or disposed in two or more separate rings of similar or different thicknesses separated by one annular space or more and further, in such a fusible plug in which the annular space or spaces separating rings of fusible metal or alloy or unoccupied by fusible metal or alloy as aforesaid is or are filled with powdery or granular material or pellets of material or the like, fusible or infusible, in order to facilitate the action of the plug.

In further explanation of this invention, description will be given of the

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manner in which it may be carried into effect, in the formation of fusible plugs forming some illustrative embodiments of the invention.

In one form of fusible plug formed according to this invention, a base or socket of gun metal or other suitable material is provided to be screwed into the plate or part of the steam or other boiler or tube or cylinder or the like to be safeguarded by the fusible plug from being overheated. This base or socket is screw threaded and into it is screwed a nipple with a conical hole extending centrally through it to receive a cylindrical pin and fusible metal or alloy. The cylindrical pin is of less diameter than the conical hole and so when the pin is placed in the conical hole there is left an annular space bounded outwardly by the wall of the conical hole and inwardly by the cylindrical surface of the pin. Into the one, conveniently the wider, end or part of this annular space is applied or poured a metal or alloy capable of fusing at a temperature intended and when this metal or alloy has been applied, part of the annular space remaining is filled to any or a predetermined extent with powdery or granular material or pellets of material or the like fusible or infusible, and then into the rest of the annular space is applied or poured metal or alloy capable of fusing at a temperature intended. The two portions of fusible metal or alloy may be of the same or different thicknesses and may be fusible at the same or different temperatures. The cylindrical pin may be provided at one or each end with a flange extending outwardly for any desirable distance for covering to any desirable extent the fusible metal or alloy and protecting it from undesir-

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able influence of fire or of gas or water or other liquid as the case may be or the pin may be made without any such flange. The nipple is intended ordinarily to be applied with the larger end of the conical hole downwards in use but if desirable in any cases the nipple may be applied with the smaller end of the hole downwards or in any other position convenient.

In other forms of fusible plug provided according to this invention with a nipple and central pin as aforesaid, the annular space between the central pin and the nipple may be filled entirely or only in part with only one mass of fusible metal or alloy or with two or more masses of fusible metal or alloy of equal or different thicknesses in contact one with another and fusible at the same or different temperatures and if there be part of such space not filled with fusible metal or alloy such part may be filled wholly or partly with powdery or granular material or pellets of material or the like, fusible or infusible.

Further the annular space between a nipple and a central pin may be made to contain more than two masses or bodies of fusible metal separated by intervening spaces either vacant or filled with powdery or granular material or pellets of material or the like, fusible or infusible.

Bases or sockets in which nipples provided and used in any of the ways hereinbefore described are screwed or to be

screwed, may be formed to be screwed or otherwise applied from the one side or from the other side in or to the plate or vessel-wall or other object to which a fusible plug is to be applied, as for example in the case of a steam boiler flue, either from the side ordinarily exposed to fire or gases or from the side ordinarily receiving contact of water.

In those cases where a base or socket for receiving a nipple as hereinbefore described is undesirable or unnecessary, the provision or use of a base or socket can be omitted and the nipple with a central pin and fusible metal applied in any of the ways hereinbefore described with or without powdery or granular material or pellets of material or the like, fusible or infusible, can be screwed immediately into the plate or vessel-wall or other object to be guarded against overheating.

The wall of the conical hole of the nipple or the central pin provided for use in a fusible plug according to this invention or both, may be tinned or treated in any other way desirable, in order that the fusible metal to be used in the plug may be applied and attached with the convenience and firmness desirable to the nipple or the pin or both.

Dated this 13th day of August, 1919.

HOWARD CHEETHAM,  
Chartered Patent Agent,  
Manchester,  
Agent for the Applicants.

## COMPLETE SPECIFICATION.

### Improvements in Fusible Plugs.

We, JOSEPH CAUTHERY, Mechanical Engineer, and WILLIAM SIMPSON SUTTON, Oil Merchant, both of 94, Market Street, Manchester, in the County of Lancaster, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to fusible plugs comprising fusible metal or alloy and less fusible, or infusible, parts between which the fusible metal or alloy is placed and its object is to provide fusible plugs which shall be more certain than fusible plugs hitherto provided have been, to operate if the parts of steam or other boilers or other vessels, tubes or cylinders or the like to which they are applied should become

overheated from shortness of water or any other cause and shall also be simple in construction.

Fusible plugs have been used or proposed for use which comprise outwardly conical bodies of fusible metal applied between outer cones or casings and central or inner cones or plugs grooved or formed with ribs or with screw threads for the inner cones or plugs and the surrounding bodies of fusible metal to be made to engage one another, and, in some of these fusible plugs the outer cones or casings are grooved or formed with screw threads for the fusible metal to be made to engage with them, and, in some cases, wads or packings of material infusible or fusible at a different temperature, and sometimes with covers of fusible or other metal or material are

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applied to prevent steam or liquid from obtaining access to the fusible metal before it is melted sufficiently to allow the wads or packings to be forced out of the outer cones or casings.

Further fusible plugs have been used or proposed for use which comprise outwardly conical rings of fusible metal applied between outer cones or casings and central plugs which are conical and furnished with shoulders in the parts to be in contact with the fusible metal and also comprise wads or packing rings of material infusible or fusible at a different temperature applied around the central plugs to aid the fusible metal in holding the central plugs in the outer cones or casings and preventing the fusible metal from escaping from the outer cones or casings before being melted sufficiently to allow the central plugs and the wads or packing rings to be freely blown or forced out from the outer cones or casings.

Further in some of the fusible plugs heretofore provided or proposed for use the inner cones or plugs are formed with shoulders for protecting the bodies of fusible metal against the access of hot gases or smoke and the conical bodies of fusible metal are placed in some cases with the wide ends upwards and in other cases with the wide ends downwards.

The invention consists in a fusible plug formed as or comprising a nipple or screwed plug, hereinafter for simplicity called a nipple, with a conical hole, a cylindrical pin placed centrally in the conical hole in the nipple and fusible metal or alloy between the pin and the nipple; also in such a fusible plug in which fusible metal or alloy between the nipple and the central pin is formed or disposed in two or more separate rings separated by one annular space or more and further, in such a fusible plug in which the annular space or spaces separating rings of fusible metal or alloy or unoccupied by fusible metal or alloy as aforesaid is or are filled with powdery or granular material or pellets of material or the like, fusible as "for example leaden or tin pellets" or infusible, as for example "sand", in order to facilitate the action of the plug.

In further explanation of this invention, description will be given of the manner in which it may be carried into effect in the formation of a fusible plug forming an illustrative embodiment of the invention, and shown in the accompanying drawing. Figs. 1 and 2 are respectively a vertical section and a plan of the fusible plug. The same letters of

reference are employed to indicate corresponding parts in both figures.

In the form of fusible plug shown in Figs. 1 and 2 formed according to this invention, a base or socket *a* of gun metal or other suitable material is provided to be screwed into the plate or part *b* of the steam or other boiler or tube or cylinder or the like to be safeguarded by the fusible plug from being overheated. This base or socket *a* is screw threaded and into it is screwed a nipple *c* with a conical hole extending centrally through it to receive a cylindrical pin *d* and fusible metal or alloy. The cylindrical pin *d* is of less diameter than the conical hole and so when the pin *d* is placed in the conical hole there is left an annular space bounded outwardly by the wall of the conical hole and inwardly by the cylindrical surface of the pin *d*. Into the one, conveniently the wider, end or part of this annular space is applied or poured a metal or alloy *e* capable of fusing at a temperature intended and when this metal or alloy *e* has been applied, part of the annular space remaining is filled to any or a predetermined extent with powdery or granular material or pellets of material or the like *f* fusible or infusible, and then into the rest of the annular space is applied or poured metal or alloy *g* capable of fusing at a temperature intended. The two portions *e g* of fusible metal or alloy may be fusible at the same or different temperatures. Fig. 1 shows a flange *h* formed at one end of the pin *d* extending outwardly to cover the fusible metal or alloy *e* and so to protect it from undesirable influence of fire or gas. A flange may be provided or applied also at the other end of the pin *d*, or a pin without a flange may be used. The nipple *c* is intended ordinarily to be applied with the larger end of the hole downwards in use.

In other forms of fusible plug provided according to this invention with a nipple *c* and central pin *d* as aforesaid, the annular space between the central pin *d* and the nipple *c* may be filled entirely or only in part with only one mass of fusible metal or alloy or with two or more masses of fusible metal or alloy in contact one with another and fusible at the same or different temperatures and if there be part of such space not filled with fusible metal or alloy such part may be filled wholly or partly with powdery or granular material or pellets of material or the like, fusible or infusible.

In those cases where a base or socket

for receiving a nipple as hereinbefore described is undesirable or unnecessary, the provision or use of a base or socket can be omitted and the nipple with a central pin and fusible metal applied in any of the ways hereinbefore described can be screwed immediately into the plate or vessel-wall or other object to be guarded against overheating.

The wall of the conical hole of the nipple or the central pin provided for use in a fusible plug according to this invention or both, may be tinned or treated in any other way desirable, in order that the fusible metal to be used in the plug may be applied and attached with the convenience and firmness desirable to the nipple or the pin or both.

Fusible plugs provided according to this invention are simple in construction and the conical holes therein promote the rapid escape of the fusible metal or alloy when the plugs are subjected to excessive temperatures.

The provision in a fusible plug of one annular space or more between rings of fusible metal or alloy whether vacant or filled with powdery or granular material or pellets of material or the like fusible or infusible is advantageous in that it allows the adjacent or next adjacent ring of fusible metal or alloy forthwith to become subject to the excessive temperature as soon as one ring of fusible metal or alloy becomes melted and escapes from the plug, so as to expose the space or to allow the powdery or granular material or pellets of material to escape. Any such powdery or granular material or pellets of material will fall clear immediately because not adherent to the sides of the hole of the space or spaces. Rapid blowing out of the plug is thus promoted should there be shortness of water in a boiler or should a boiler furnace become overheated from any other cause.

Further fusible plugs provided according to this invention while advantageous

in the ways aforesaid afford incidentally the advantages, present in some fusible plugs already known, that until fusible metal melts there are no exposed cavities liable to become choked with dust or deposits and the absence of such cavities enables the fusible metal to be brought nearer the fire and so there is no opportunity for dirt and deposits to fill cavities and thereby to hinder the melting of the fusible metal or the escape of the fusible metal when it is melted.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A fusible plug with a cylindrical pin placed centrally in a conical hole in the nipple or screwed plug and fusible metal or alloy between the pin and the nipple, substantially as hereinbefore described.

2. A fusible plug as claimed in Claim 1, in which fusible metal or alloy between the nipple or plug and the central pin is formed or disposed in two or more separate rings separated by one annular space or more, substantially as hereinbefore described.

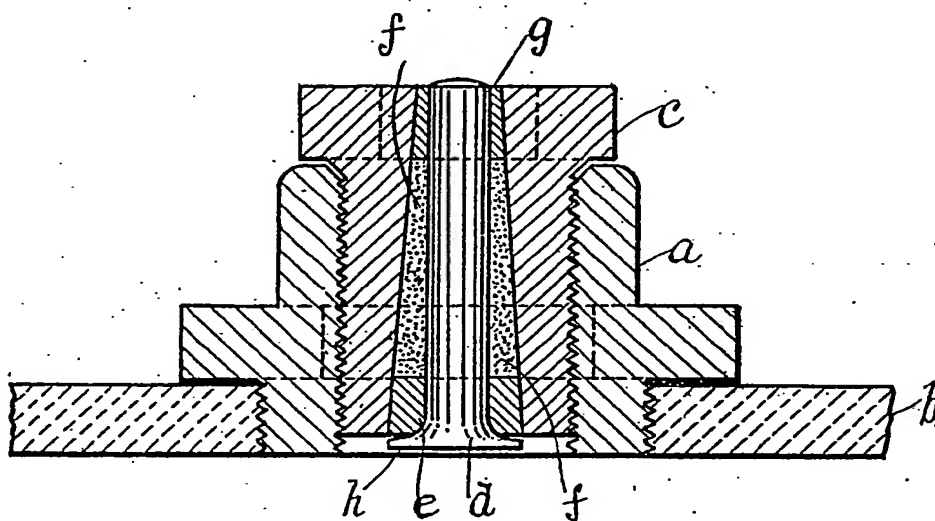
3. A fusible plug as claimed in Claim 2, in which the annular space or spaces separating rings of fusible metal or alloy is or are filled with powdery or granular material or pellets of material or the like, fusible or infusible, substantially as hereinbefore described.

4. A fusible plug as claimed in Claim 1, Claim 2 or Claim 3 having rings of fusible metal or alloy which are fusible at different temperatures, substantially as hereinbefore described.

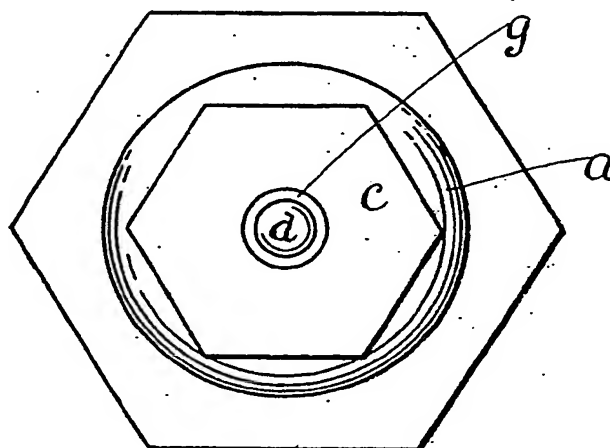
Dated this 12th day of May, 1920.

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*Fig. 1.*



*Fig. 2.*



Malby & Sons, Photo-Litho.

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